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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Elevated nitrogen-containing particles observed in Asian dust aerosol samples collected at the marine boundary layer of the Bohai Sea and the Yellow Sea" *by* H. Geng et al.

Anonymous Referee #1

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This is an important and comprehensive paper on the interaction of (mainly) natural dust plumes and anthropogenic pollution in Asia. In spite of the fact that the number of samples is limited to only 6, equally divided between normal days and dust storm events, the elemental compositions of a large number of individual particles provide good basis for the evaluation of atmospheric processes. This study is very useful in supplementing the growing number of bulk aerosol measurements mostly in continental Asia. In fact, very few studies are available on MBL aerosol in that region, so this study

is valuable in this respect, too. Although it may be rational for dust aerosol studies, it is a pity that by selecting the sampling device the authors gave up collecting particles below AED 1 micrometer, the size range in which important interactions with pollutant may also take place. It is well known that the size distribution of dust aerosol shifts well below 1 micrometer upon long-range atmospheric transport across the Pacific. Therefore, it may be misleading to use the term 'fine fraction' throughout the paper for aerosols in the size range 1.0-2.5 micron, since by definition there is no lower size cut for 'fine aerosols' (usually defined as AED <1 micrometer, in health- or regulation-related studies as AED <2.5 micrometer). I would suggest that the authors should use a somewhat less deceptive term for this rather specific intermediate size range.

Specific comments: Page 13663 line 5: more oxygen in fine particles: could structural or crystal water be still present in some solid particles?

Line 23: how could reacted sea salt be internally mixed with soil derived particles? Is resuspension of deposited particles trapped in the sea surface microlayer possible by bubble bursting?

The lack of soot particles attached to larger particles is surprising (page 1364, line 14-15) and may deserve additional comment.

Page 13665 line 19: how a hygroscopic compound can absorb seawater droplets?

Line 20: the sentence suggests that ammonia and nitric acid vapors can nucleate, which is not true: the entire paragraph needs careful reconsideration.

Page 13666 line 2: as it is understood now, HULIS mostly come from biomass burning: see Lukacs et al., JGR 2007, Feczko et al., JGR 2007)

Page 13667 line 10, it is trivial that the lower the particle size, the larger the effective specific surface area (see Warneck, 2001)

Line 18 and Page 13668 line 15: HNO3 is far more abundant in the gas phase than H2SO4 due to its much higher vapor pressure, so in terms of atmospheric processing

(ageing) primarily not the precursors (NOx and SO2) are interesting in themselves but photochemistry, sink processes and a number of other factors play a more important role.

Page 13669 line 25: '. . .elevated sea salt. . .': add 'concentrations'

Page 13670 line 19: part of N may come from the reaction of nitric acid with NaCl and MgCl2 also present in the droplets

Page 13670 line 26 it is reasonable that in the dust storm in that size range ammonium-sulfate formation is suppressed since sulfuric acid was taken up by mineral particles

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